

Claims:

1.(Original) A voltage-controlled oscillator, comprising:

a plurality of cascaded voltage-controlled oscillator cells, each voltage-controlled oscillator cell having a plurality of outputs, each voltage-controlled oscillator cell further comprising:

a pair of source coupled nMOS transconductor transistors;

a bias transistor coupled between a ground voltage and the source coupled nMOS transconductor transistors;

a pair of varactors coupled to a control voltage and the pair of source coupled nMOS transconductor transistors;

a pair of drain coupled pMOS transistors, the pair of drain coupled pMOS transistors coupled between a supply voltage and the pair of source coupled nMOS transconductor transistors; and

a common mode feedback circuit, the common mode feedback circuit further comprising:

a resistive network, the resistive network having a plurality of coupled resistors, each resistor coupled to one of the plurality of outputs of each voltage-controlled oscillator cell; and

an op-amp, the op-amp connected to the resistive network, the op-amp generating an output voltage corresponding to a variance between the voltage-controlled oscillator cells and a reference voltage on a reference voltage output, the reference voltage output being coupled to each bias transistor in the plurality of cascaded voltage-controlled oscillator cells.

2.(Original) The voltage-controlled oscillator of claim 1, wherein the pair of varactors are MOS voltage-controlled capacitors.

3.(Original) The voltage-controlled oscillator of claim 1, wherein the pair of varactors are p-n junction voltage-controlled capacitors.

4.(Original) The voltage-controlled oscillator of claim 1, wherein the control voltage is provided at least in part by a charge pump circuit.

5.(Original) The voltage-controlled oscillator of claim 1, wherein the control voltage is provided at least in part by a loop filter circuit.

6.(Original) The voltage-controlled oscillator of claim 1, wherein the control voltage is provided at least in part by a phase frequency detector circuit.

7.(Original) The voltage-controlled oscillator of claim 1, wherein the control voltage is provided at least in part by a charge pump coupled with a loop filter circuit coupled with a phase frequency detector circuit.

8.(Original) The voltage-controlled oscillator of claim 1, wherein the plurality of cascaded voltage-controlled oscillator cells consists of three cascaded voltage-controlled oscillator cells.

9.(Currently Amended) A voltage-controlled oscillator, comprising:

a plurality of cascaded voltage-controlled oscillator cells, each voltage-controlled oscillator cell having at least one output, each voltage-controlled oscillator cell further comprising:

a first pair of coupled transistors;

a bias transistor coupled to the first pair of coupled transistors;

at least one voltage-controlled capacitor coupled to a control voltage and to the first pair of coupled transistors; ~~and~~

a second pair of coupled transistors, the second pair of coupled transistors further coupled to the first pair of coupled transistors; ~~;~~ and

a common mode feedback circuit that simultaneously receives signals from each voltage controlled oscillator cell.

10.(Currently Amended) The voltage-controlled oscillator of claim 9, wherein ~~further comprising:~~

~~a common mode feedback circuit,~~ the common mode feedback circuit further comprising:

a resistive network, the resistive network having a plurality of coupled resistors, each resistor coupled to the at least one output of each voltage-controlled oscillator cell; and

an op-amp, the op-amp connected to the resistive network, the op-amp generating an output voltage corresponding to a variance between the voltage-controlled oscillator cells and a reference voltage on a reference voltage output, the reference voltage output being coupled to each bias transistor in the plurality of cascaded voltage-controlled oscillator cells.

11.(Original) The voltage-controlled oscillator of claim 9, wherein the pair of varactors are MOS voltage-controlled capacitors.

12.(Original) The voltage-controlled oscillator of claim 9, wherein the pair of varactors are p-n junction voltage-controlled capacitors.

13.(Original) The voltage-controlled oscillator of claim 9, wherein the control voltage is provided at least in part by a charge pump circuit.

14.(Original) The voltage-controlled oscillator of claim 9, wherein the control voltage is provided at least in part by a loop filter circuit.

15.(Original) The voltage-controlled oscillator of claim 9, wherein the control voltage is provided at least in part by a phase frequency detector circuit.

16.(Original) The voltage-controlled oscillator of claim 9, wherein the control voltage is provided at least in part by a charge pump coupled with a loop filter circuit coupled with a phase frequency detector circuit.

17.(Original) The voltage-controlled oscillator of claim 9, wherein the plurality of cascaded voltage-controlled oscillator cells consists of three cascaded voltage-controlled oscillator cells.

18.(Original) A method for reducing jitter in a voltage-controlled oscillator having a plurality of voltage-controlled oscillator cells, each voltage-controlled oscillator cell having a plurality of output voltage waveforms, the method comprising:

- combining each of the output voltage waveforms to produce a combined waveform;
- deriving a common mode feedback waveform from the combined waveform and from a reference waveform; and
- transmitting the common mode feedback waveform to each of the plurality of voltage-controlled oscillator cells.

19.(Original) A voltage-controlled oscillator having a plurality of voltage-controlled oscillator cells, each voltage-controlled oscillator cell having a plurality of output voltage waveforms, comprising:

- combining means for combining each of the output voltage waveforms to produce a combined voltage;
- deriving means for deriving a common mode feedback voltage from the combined voltage and a reference voltage; and
- transmitting means for transmitting the common mode feedback voltage to each of the plurality of voltage-controlled oscillator cells.

20.(Currently Amended) A wireless communications device, comprising:

- a voltage-controlled oscillator having a plurality of cascaded voltage-controlled oscillator cells, each voltage-controlled oscillator cell having at least one output, each voltage-controlled oscillator cell further comprising:
 - a first pair of coupled transistors;
 - a bias transistor coupled to the first pair of coupled transistors;

at least one voltage-controlled capacitor coupled to a control voltage and the first pair of coupled transistors; [and]
a second pair of coupled transistors, the second pair of coupled transistors further coupled to the first pair of coupled transistors; and
a common mode feedback circuit that simultaneously receives signals from each voltage controlled oscillator cell.

21.(Currently Amended) The voltage-controlled oscillator of claim 20, wherein ~~further comprising:~~

~~a common mode feedback circuit,~~ the common mode feedback circuit further comprising:
a resistive network, the resistive network having a plurality of coupled resistors, each resistor coupled to the at least one output of each voltage-controlled oscillator cell; and
an op-amp, the op-amp connected to the resistive network, the op-amp generating an output voltage corresponding to a variance between the voltage-controlled oscillator cells and a reference voltage on a reference voltage output, the reference voltage output being coupled to each bias transistor in the plurality of cascaded voltage-controlled oscillator cells.

22.(Original) The voltage-controlled oscillator of claim 20, wherein the pair of varactors are MOS voltage-controlled capacitors.

23.(Original) The voltage-controlled oscillator of claim 20, wherein the pair of varactors are p-n junction voltage-controlled capacitors.

24.(Original) The voltage-controlled oscillator of claim 20, wherein the control voltage is provided at least in part by a charge pump circuit.

25.(Original) The voltage-controlled oscillator of claim 20, wherein the control voltage is provided at least in part by a loop filter circuit.

26.(Original) The voltage-controlled oscillator of claim 20, wherein the control voltage is provided at least in part by a phase frequency detector circuit.

27.(Original) The voltage-controlled oscillator of claim 20, wherein the control voltage is provided at least in part by a charge pump coupled with a loop filter circuit coupled with a phase frequency detector circuit.

28.(Original) The voltage-controlled oscillator of claim 20, wherein the plurality of cascaded voltage-controlled oscillator cells consists of three cascaded voltage-controlled oscillator cells.

29.(Currently Amended) A high-speed serial data link semiconductor chip, comprising:

a voltage-controlled oscillator having a plurality of cascaded voltage-controlled oscillator cells, each voltage-controlled oscillator cell having at least one output, each voltage-controlled oscillator cell further comprising:

a first pair of coupled transistors;
a bias transistor coupled to the first pair of coupled transistors;
at least one voltage-controlled capacitor coupled to a control voltage and the first pair of coupled transistors; ~~and~~
a second pair of coupled transistors, the second pair of coupled transistors further coupled to the first pair of coupled transistors; ~~and~~
a common mode feedback circuit that simultaneously receives signals from each voltage controlled oscillator cell.

30.(Currently Amended) The semiconductor chip of claim 29, wherein ~~further comprising:~~

~~a common mode feedback circuit,~~ the common mode feedback circuit further comprising:
a resistive network, the resistive network having a plurality of coupled resistors, each resistor coupled to the at least one output of each voltage-controlled oscillator cell; and
an op-amp, the op-amp connected to the resistive network, the op-amp generating an output voltage corresponding to a variance between the voltage-controlled oscillator cells and a reference voltage on a reference voltage output, the reference voltage output being coupled to each bias transistor in the plurality of cascaded voltage-controlled oscillator cells.

31.(Original) The semiconductor chip of claim 29, wherein the pair of varactors are MOS voltage-controlled capacitors.

32.(Original) The semiconductor chip of claim 29, wherein the pair of varactors are p-n junction voltage-controlled capacitors.

33.(Original) The semiconductor chip of claim 29, wherein the control voltage is provided at least in part by a charge pump circuit.

34.(Original) The semiconductor chip of claim 29, wherein the control voltage is provided at least in part by a loop filter circuit.

35.(Original) The semiconductor chip of claim 29, wherein the control voltage is provided at least in part by a phase frequency detector circuit.

36.(Original) The semiconductor chip of claim 29, wherein the control voltage is provided at least in part by a charge pump coupled with a loop filter circuit coupled with a phase frequency detector circuit.

37.(Original) The semiconductor chip of claim 29, wherein the plurality of cascaded voltage-controlled oscillator cells consists of three cascaded voltage-controlled oscillator cells.